CENG 105 Intro to CS
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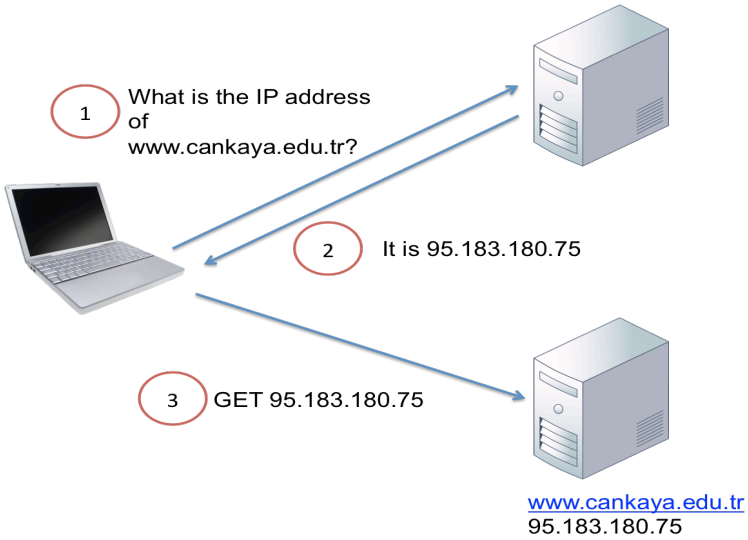
Assignment 2

Due: Nov 20, 2017

Subject: Networks and the Internet

How the Internet Works

An IP address is made up of four 8-bit numbers separated by dots. For example, 216.58.209.4. Since people cannot remember numbers, we use "*domain names*" when referring web sites. For example, the IP address 216.58.209.4 is for www.google.com. And the computers use Domain Name Servers (DNS) to find the IP address for any web site. Here is how it works:



1) Answer the following questions according to the above description:
   a. How many bit an IP address has? 32 bit (4x8bit)
   b. What is the largest possible IP address? 255.255.255.255
   c. How many different IP addresses can be given? 2^{32} = 2,147,483,648
   d. Are there enough unique IP addresses to assign to all computers, phones, and devices in the world? Estimate the numbers needed? If not enough, what is the solution? Possibly not, soon it will be a problem. Estimates run from couple billions and will increase in near future. Therefore, there is IPv4 as a solution with 128 bits IP numbers.
   e. What is the domain name of the requested server in the picture? cankaya.edu.tr
   f. What is the IP address of the requested server? 95.183.180.75
   g. What is the function of a DNS server? A directory with domain name to IP matching
   h. Give examples of domain names you use frequently? Two .com, two .org, two .edu along with their IP addresses. Use **host** function in your computer or something else.

      > host google.com
      google.com has address 216.58.206.206
      google.com has IPv6 address 2a00:1450:4017:807::200e
      google.com mail is handled by 20 alt1.aspmx.l.google.com.

google.com mail is handled by 30 alt2.aspmx.l.google.com.
google.com mail is handled by 40 alt3.aspmx.l.google.com.
google.com mail is handled by 10 aspmx.l.google.com.
google.com mail is handled by 50 alt4.aspmx.l.google.com.

> host kaggle.com
kaggle.com has address 168.62.224.13
kaggle.com mail is handled by 10 alt3.aspmx.l.google.com.
kaggle.com mail is handled by 10 alt4.aspmx.l.google.com.
kaggle.com mail is handled by 1 aspmx.l.google.com.
kaggle.com mail is handled by 5 alt1.aspmx.l.google.com.
kaggle.com mail is handled by 5 alt2.aspmx.l.google.com.

i. What is the IP address of your phone now? ???.???.???.???

2) Go to TCPIPutils.com and search for your school's domain name. Scroll down half-way to "Network information".
   a. Identify the range of IP addresses used by your school.
   b. Does the university have enough IP addresses for all students, faculty, and staff (and their multiple devices)? Explain your answer.

Measuring Your Network

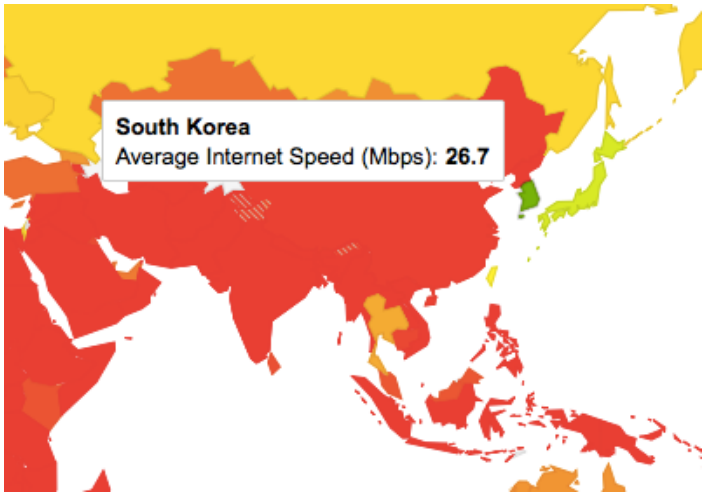
Your network performance can be measured in two ways:

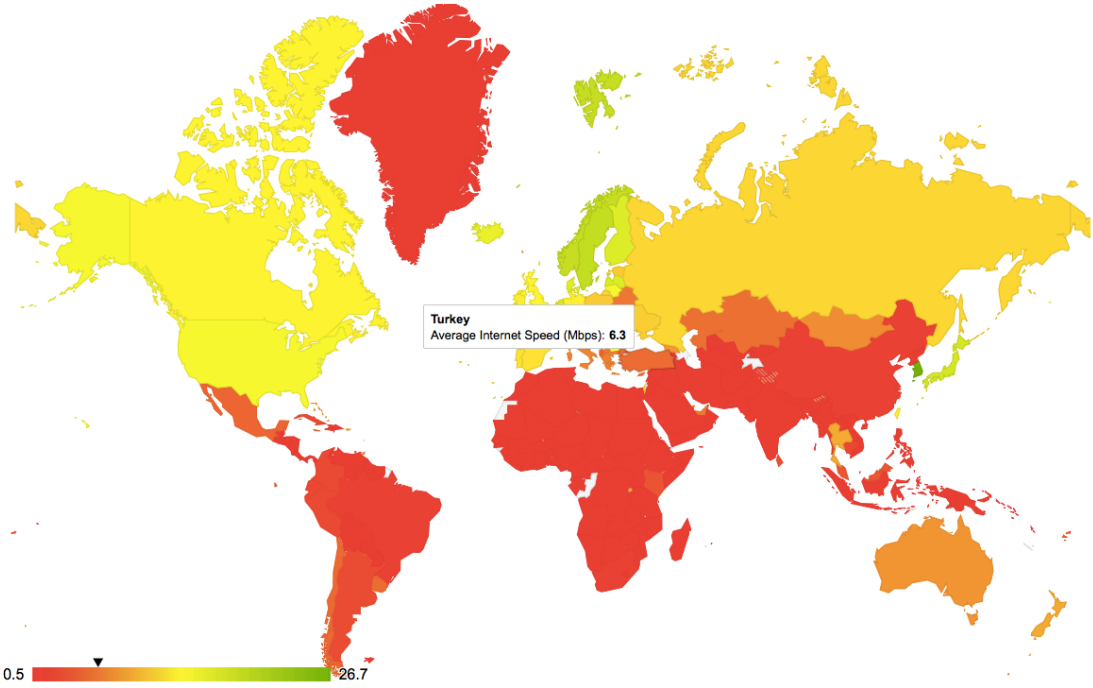
- **bandwidth** – the rate at which data is downloaded or uploaded to a network, measured in bits per second (bps), kilobits per second (kbps), or megabits per second (Mbps)
- **latency** – how much time it takes (in milliseconds) for a request to reach its destination

3) Consider how performance should be measured:
   a. For bandwidth, would good performance be a large number or a small number?
   b. For latency, would good performance be a large number or a small number?
4) Use CNET's bandwidth tool (http://www.cnet.com/internet-speed-test/) to measure bandwidth on campus and later at home. Report download and upload speeds.
5) Use Pingdom's speed test (https://tools.pingdom.com/) to measure the average latency between New York City and:
   a. http://google.com
   b. http://www.cankaya.edu.tr
   c. Any website you use
6) Search for "*Internet speed by country*" to find the interactive maps on fastmetrics.com. Which country has the fastest **average speed**? How does Turkey compare?

   https://www.fastmetrics.com/internet-connection-speed-by-country.php

   The fastest country is **South Korea** with 26.7mpbs ☺. **Turkey** is 6.3mps ☹





Submit your work as a zip/rar file (**asg2-your-name.zip**) to webonline.

Note: No late assignments. Questions are adapted from James Madison University's CS101 course.